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PROCESS OF MAKING TETRANITRO-METHANE EXPLOSIVES

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2 Claims. (Cl. 52—20)

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This invention relates to new explosives. More particularly, it relates to new explosive mixtures capable of detonation with unusual violence and penetrating power.

It is well known that explosives such as TNT, hexogen, pentaerythritol tetranitrate, tetryl, nitroglycerine, nitroglycol, certain mixtures of tetranitromethane and carbonaceous materials as oils, mixtures of liquid oxygen and carbon, mixtures of liquid N_2O_4 and carbon, and others, detonate with high explosive energy and also produce a detonating wave of high velocity. Of these various explosives certain tetranitromethane-oil mixtures have rates of detonation of somewhat over 9300 meters per second, which, to the best of my knowledge, are the highest rates reported in the literature for any heretofore known explosive.

I have discovered that tetranitromethane dissolves lead alkyls and that certain mixtures of these alkyls with tetranitromethane produce an explosive of far greater violence, per unit of volume, than any other known explosive or explosive mixture. More specifically, I have found that the alkyls of lead produce mixtures with tetranitromethane which have an unusual explosive strength and an unusually high rate of detonation.

The alkyls, combined with lead, which are particularly useful for my explosives are methyl, ethyl, propyl, butyl and amyl, including their isomers, although tetraethyl lead by virtue of its high density, chemical stability, when pure, and its excellent miscibility with tetranitromethane is preferred above all others.

The proportions of lead alkyl to tetranitromethane may be varied over a considerable range and still produce powerful explosive mixtures. In general, however, it is preferred to have oxygen balanced mixtures, that is, mixtures in which the oxygen of the tetranitromethane is present to just the extent theoretically required to form CO_2 with all the carbon present, H_2O with all the hydrogen, the highest stable metallic oxide with all the metal present, and, to theoretically have all the nitrogen in the products of the detonation present as N_2. The molecular proportions of the two materials required to give this oxygen balance are shown in the following equation representing the reaction of lead tetraethyl with tetranitromethane.

$$2Pb(C_2H_5)_4+9C(NO_2)_4=2PbO+25CO_2+18N_2+20H_2O$$

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From the equation and the molecular weights of the reacting compounds, 323.4 and 196.0 respectively, it may be calculated that for this oxygen balance, there is used approximately 35.6 parts of the tetraethyl lead for 100 parts of the tetranitromethane. Mixtures such as this give the highest rates of detonation and explosive energy. In this connection it should be noted that mixtures having a "CO" balance, that is, having only enough tetranitromethane to form CO with the carbon present in the mixture and theoretically enough to form the metal oxides and water mentioned above still have unusually high explosive energy. The proportions required for the carbon monoxide balance may be calculated from the following equation.

$$7Pb(C_2H_5)_4+19C(NO_2)_4=7PbO+75CO+70H_2O+38N_2$$

The calculation from this equation and the molecular weights of the reacting substances shows that, for the carbon monoxide balance, there is required approximately 61 parts of the tetraethyl lead for 100 parts of the tetranitromethane, proportions here and elsewhere herein being expressed as parts by weight unless specifically stated to the contrary.

Also, although my preferred explosive mixtures consist of tetranitromethane and one or more of the lead alkyls, I may at times use a third material which is a mutual solvent for these reactants, in order to provide a safer means for preparing and handling my explosive mixtures and also to provide mixtures of graded strengths. Such a third material is pentane, hexane, heptane, octane, gasolene, hydrocarbon oils, or the like.

The preferred method of preparing my new explosive mixtures is to have the required amounts of each constituent in separate containers or compartments and to mix these at the time of use, preferably by remote-controlled, automatic means.

Specific examples of the use of my mixtures are in the case bombs to be dropped from aeroplanes, in which the constituents are in separate compartments within the missile and are not mixed until a definite drop has been made by the bomb; or in the case of torpedoes launched at sea, such torpedoes having separate compartments for each constituent and mechanical means for mixing the constituents after the torpedo is on its way to the target.

Tetranitromethane itself is not an explosive and can be stored in aeroplanes, submarines, etc.

without the additional hazard usually associated with complete explosives. Similarly, the alkyls are not explosives and can be stored in separate containers to obtain additional safety.

It is to be noted that the preferred explosive mixtures of the present invention are intended for use under conditions where the explosive ingredients are mechanically mixed in the missile itself just before the latter is to be detonated.

An example of my preferred explosive mixture, in which all parts are by weight, is the following:

Tetranitromethane ($C(NO_2)_4$)	177
Tetraethyl lead ($(C_2H_5)_4Pb$)	65

This mixture is essentially oxygen balanced, is very sensitive to friction and shock and should be mixed by remote control and not by the ordinary methods used in industry.

It is, of course, understood that a person skilled in this art may advantageously select and vary the amounts and nature of the ingredients of my new compositions to obtain certain specific results, without departing from the essence of my invention, and I therefore do not limit myself in any way except as indicated in the appended claims.

I claim:

1. The method of making an explosive mixture which comprises mixing tetranitromethane with a tetraalkyl lead, the tetranitromethane being used in proportion at least equal to the amount required theoretically to oxidize all carbon in the tetraalkyl lead to carbon monoxide and not above the amount required to oxidize all of the carbon to carbon dioxide, these amounts being in addition to the tetranitromethane required to oxidize all lead present to lead monoxide and all hydrogen present to water.

2. The method of making an explosive mixture which comprises mixing tetranitromethane with tetraethyl lead in proportion within the range 35.6 to 61 parts by weight for 100 parts of the tetranitromethane.

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